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CLAIMS

1. An immunological assay for the detection and/or quantification of MDA-modified LDL and OxLDL in a sample, said assay comprising:

(a) contacting the sample with a first antibody that has high affinity for MDA-modified LDL and OxLDL; and

(b) thereafter visualizing and/or quantifying a binding reaction between the first antibody and the MDA-modified LDL and OxLDL present in the sample;

wherein the MDA-modified LDL and OxLDL for which the first antibody has high affinity contain at least 60 substituted lysine moieties per apo B-100 moiety.

2. The assay of claim 1 in which the MDA-modified LDL and OxLDL for which the first antibody has high affinity contain at least about 90 substituted lysine moieties per apo B-100 moiety.

3. The assay of claim 1 in which the MDA-modified LDL and OxLDL for which the first antibody has high affinity contain at least about 120 substituted lysine moieties per apo B-100 moiety.

4. The assay of claim 1 in which the MDA-modified LDL and OxLDL for which the first antibody has high affinity contain at least about 210 substituted lysine moieties per apo B-100 moiety.

5. The assay of claim 1 in which the MDA-modified LDL and OxLDL for which the first antibody has high affinity contain at least about 240 substituted lysine moieties per apo B-100 moiety.

6. The assay of any of claims 1 to 5 which is a competitive assay.

7. The competitive assay of claim 6 in which MDA-modified LDL and/or OxLDL are bound to a substrate, comprising contacting the sample and the first antibody with the substrate having bound to it MDA-modified LDL and OxLDL.

8. The assay of any of claims 1 to 5 which is a sandwich assay in which the first antibody is bound to a substrate, comprising contacting the sample with the substrate having bound to it the first antibody.

9. The assay of claim 8 in which a second antibody is used and the second antibody has high affinity for MDA-modified LDL and OxLDL.

10. The assay of claim 9 in which the second antibody has high affinity for native LDL.

11. The assay of any of claims 1 to 5 which is an immunohistochemical assay in which the sample is a tissue sample and it is contacted with the first antibody.

12. The assay of any of the preceding claims in which the affinity constant of the first antibody for MDA-modified LDL and for OxLDL is at least about 1×10^{10} M^{-1}.

13. The assay of any of the preceding claims in which the first antibody has low affinity for native LDL.

14. The assay of claim 13 in which the affinity constant of the first antibody for native LDL is less than about 1×10^{6} M^{-1}.

15. The assay of any of the preceding claims in which the first antibody is the monoclonal antibody mAb-4E6 produced by hybridoma Hyb4E6 deposited at the BCCM under deposit accession number LMBP 1660 CB on or about April 24, 1997.

16. The assay of any of claims 8 to 10 in which the affinity constant of the second antibody for MDA-modified LDL and for OxLDL is at least about 1×10^{10} M^{-1}.

17. The assay of claim 16 in which the affinity constant of the second antibody for native LDL is at least about 1×10^{9} M^{-1}.

18. The assay of claim 17 in which the second antibody is the monoclonal antibody mAb-8A2 produced by hybridoma Hyb8A2 deposited at the BCCM under deposit accession number LMBP 1661 CB on or about April 24, 1997.

19. The assay of any of the preceding claims in which the sample is derived from the fluid or tissue of a human being.

20. An immunological sandwich assay for the detection and/or quantification of MDA-modified LDL in a sample in which assay a first antibody that has a high affinity for MDA-modified LDL is bound to a substrate, said assay comprising:

(a) contacting the sample with the substrate having bound to it the first antibody under binding conditions so that at least some of any MDA-modified LDL in the sample will bind to the first antibody;

(b) thereafter removing unbound sample from the substrate;

(c) thereafter contacting the substrate with a second antibody that has a high affinity for MDA-modified LDL; and

(d) thereafter visualizing and/or quantifying the MDA-modified LDL that was present in the sample;

wherein the MDA-modified LDL for which the first antibody and the second antibody have high affinity contains at least 60 substituted lysine moieties per apo B-100 moiety.

21. The assay of claim 20 in which the MDA-modified LDL for which the first antibody and the second antibody have high affinity contains at least about 90 substituted lysine moieties per apo B-100 moiety.

22. The assay of claim 20 in which the MDA-modified LDL for which the first antibody and the second antibody have high affinity contains at least about 120 substituted lysine moieties per apo B-100 moiety.

23. The assay of claim 20 in which the MDA-modified LDL for which the first antibody and the second antibody have high affinity contains at least about 210 substituted lysine moieties per apo B-100 moiety.

24. The assay of claim 20 in which the MDA-modified LDL for which the first antibody and the second

antibody have high affinity contains at least about 240 substituted lysine moieties per apo B-100 moiety.

25. The assay of any of claims 20 to 24 in which the first antibody also has high affinity for OxLDL.

26. The assay of any of claim 20 to 25 in which the first antibody has low affinity for native LDL.

27. The assay of any of claims 20 to 24 and 26 in which the first antibody has low affinity for OxLDL.

28. The assay of any of claims 20 to 27 in which the second antibody has high affinity for native LDL.

29. The assay of any of claims 20 to 28 in which the affinity of the first antibody for MDA-modified LDL is at least about $1 \times 10^{10}\ M^{-1}$.

30. The assay of any of claims 20 to 29 in which the affinity of the first antibody for native LDL is less than about $1 \times 10^{6}\ M^{-1}$.

31. The assay of any of claims 20 to 30 in which the affinity of the second antibody for native LDL is at least about $1 \times 10^{9}\ M^{-1}$.

32. The assay of any of claims 20 to 26 and 28 to 31 in which the first antibody is the monoclonal antibody mAb-4E6 produced by hybridoma Hyb4E6 deposited at the BCCM under deposit accession number LMBP 1660 CB on or about April 24, 1997.

33. The assay of any of claims 20 to 24 and 26 to 31 in which the first antibody is the monoclonal antibody mAb-1H11 produced by hybridoma Hyb1H11 deposited at the BCCM under deposit accession number LMBP 1659 CB on or about April 24, 1997.

34. The assay of any of claims 20 to 33 in which the second antibody is the monoclonal antibody mAb-8A2 produced by hybridoma Hyb8A2 deposited at the BCCM under deposit accession number LMBP 1661 CB on or about April 24, 1997.

35. Monoclonal antibody mAb-4E6 produced by hybridoma Hyb4E6 deposited at the BCCM under deposit accession number LMBP 1660 CB on or about April 24, 1997.

36. Hybridoma Hyb4E6 deposited at the BCCM under deposit accession number LMBP 1660 CB on or about April 24, 1997.

37. Monoclonal antibody mAb-8A2 produced by hybridoma Hyb8A2 deposited at the BCCM under deposit accession number LMBP 1661 CB on or about April 24, 1997.

38. Hybridoma Hyb8A2 deposited at the BCCM under deposit accession number LMBP 1661 CB on or about April 24, 1997.

39. A stable standard containing MDA-modified LDL whose extent of substitution of its lysine moieties will remain essentially constant over normal periods of time during normal storage for biological materials, the MDA-modified LDL of said standard being made by contacting malondialdehyde with LDL at a predetermined molar ratio of malondialdehyde to the apo B-100 moiety of the LDL, the standard containing an agent that reduces the ability of any metal ions present to catalyze oxidation of the LDL and/or an anti-oxidant.

40. The standard of claim 39 wherein both an agent that reduces the ability of any metal ions present to catalyze oxidation of the LDL and an anti-oxidant are present.

41. The standard of any of claims 39 to 40 wherein the agent that reduces the ability of any metal ions present to catalyze oxidation of the LDL is a chelating agent.

42. The standard of claim 41 wherein the chelating agent is EDTA.

43. The standard of any of claims 39 to 42 wherein the anti-oxidant is selected from the group consisting of BHT and Vitamin E.

44. The standard of any of claims 39 to 43 further comprising a physiological fluid.

45. The standard of claim 44 wherein the physiological fluid is plasma.

46. The standard of any of claims 39 to 45 further comprising at least one anti-platelet compound and/or anti-coagulant.

47. A stable calibrator for assays for MDA-modified LDL comprising the standard of any of claims 39 to 46.

48. A stable control for assays for MDA-modified LDL comprising the standard of any of claims 39 to 46.

49. A stable calibrator for assays for OxLDL comprising the standard of any of claims 39 to 46.

50. A stable control for assays for OxLDL comprising the standard of any of claims 39 to 46.

51. A kit for conducting a sandwich assay for the determination of OxLDL or MDA-modified LDL or both in a sample, said kit comprising:

(a) a substrate on which is bound a first antibody that has high affinity for OxLDL or MDA-modified LDL or both, the OxLDL and MDA-modified LDL each having at least 60 substituted lysine moieties per apo B-100 moiety, and

(b) a labeled antibody having a high affinity for OxLDL that becomes bound to the first antibody during the assay or for MDA-modified LDL that becomes bound to the first antibody during the assay or for both that become bound to the first antibody during the assay.

52. The kit of claim 51 further comprising a reactive substance for reaction with the labeled antibody to give an indication of the presence of the labeled antibody.

53. The kit of claim 51 wherein the reactive substance comprises an enzyme.

54. The kit of any of claims 51 to 53 further comprising the stable calibrator of any of claims 47 or 49.

55. The kit of any of claims 51 to 54 further comprising the stable control of any of claims 48 or 50.